

HOW TO... Use Excel's functions

In the second instalment of our Excel functions tutorial, Rod Lawton adds a few ambitious features to his finances worksheet

Worksheets can often end up as eye-numbing walls of data. You know the information you want is in there somewhere, but it's buried among all those columns of numbers. What you really need is a worksheet that highlights the important parts automatically, enabling you to see at a glance what you need to do and where to turn your attention.

Last month we looked at the basics of Excel functions and how to use them. A copy of that tutorial is on the cover disc that comes with this issue. This month we'll look at a few more advanced functions in Excel. We can't possibly cover them all – there are far too many for that. However, we can give examples of the ways in which you can use functions, and also advise you on how to use complex functions safely.

There's quite a lot of similarity between Excel functions and the disciplines of programming. In both cases you're telling an extremely pedantic machine exactly what you want it to do, and spelling out each step with great precision.

While the main point of this tutorial is to show off some of the amazing things you can do with Excel's functions, we should also sound a note of caution. It's very easy to get carried away and produce an extremely complicated and clever worksheet full of interrelated and interdependent functions that you understand completely while you're using them and the process of creation is all still fresh in your mind. Six months later, however, when you need to sort out something that's gone

wrong, will you really remember what you did, why you did it and how it all works? In other words, it's important that you treat functions with caution because there is no room for error, and because you (and others) will need to be able to decipher what you've done.

With those words of warning out of the way, we're ready to build on the financial worksheet we created last time. In the process, we'll introduce new Excel functions in three categories. The IF function is a logical function that produces one of two outcomes depending on the data. It introduces a degree of programmability into your worksheets, and we use it here to warn you of overspends – and to keep quiet when everything's OK.

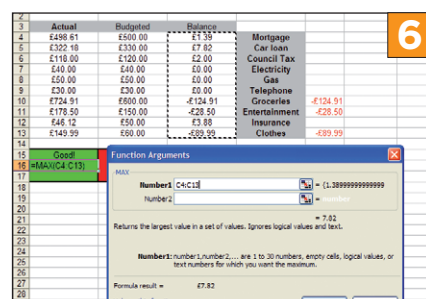
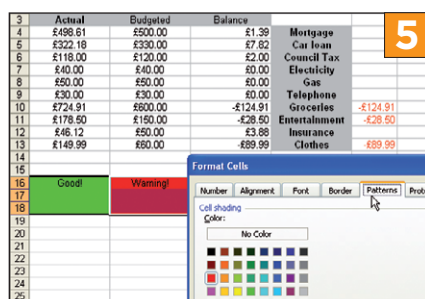
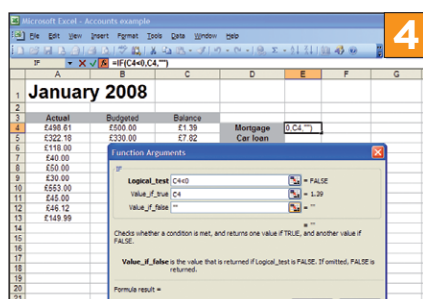
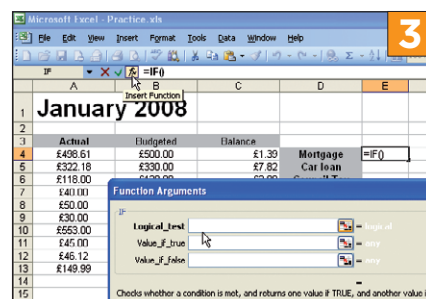
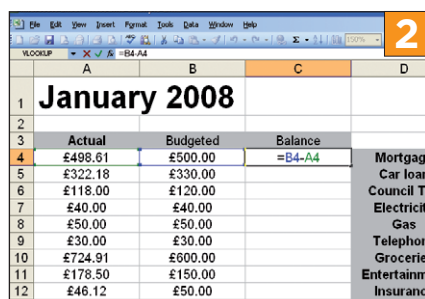
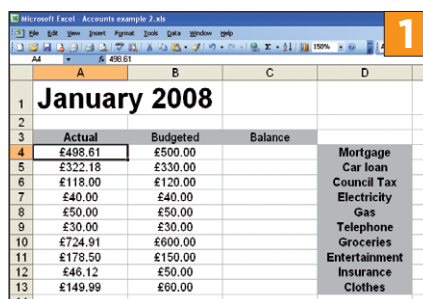
We also use two statistical functions, MIN and MAX, to pick out the most important values in a mass of data, and we finish off with the VLOOKUP function. This is a little more formidable, but it's immensely useful as it introduces Excel's 'Lookup & Reference' functions. With these it's possible to search for and find data automatically, turning your worksheets into mini-databases.

1 In last month's walkthrough we made a worksheet that categorises and totals household expenses over a six-month period. Here we'll use average expenditure to estimate a budget for the forthcoming year, and to see how we're doing month by month. You can find a copy of this worksheet on the cover disc. The file is called Accounts example 2.xls.

The worksheet has a column for Actual expenditure, a column for Budgeted expenditure and a column for the Balance (which shows whether our actual expenditure is under or over budget). Next to each figure is the category to which it belongs, such as Gas or Mortgage. Our category headings are on the right-hand side rather than the left to accommodate one of the functions we're going to use later.

2 At the moment the Balance column is blank. To create a formula for calculating the balance, click in the first empty cell in that column and enter =B4-A4. B4 is the budgeted figure and A4 is the actual amount spent. By subtracting the second figure from the first, we can find out how much money is left over. Copy this formula down the column by moving the mouse pointer over the cell's bottom right-hand corner and, holding down the left mouse button, dragging down the empty cells underneath.

3 It would be useful if we could display a warning each time we spent more than our budgeted amount. We can do this with the IF function. First, select the blank cell to the right of the first category heading – cell E4. Then click on the 'fx' button on the Formula Bar to display the Insert Function dialog box. You will find the IF function among the Logical functions in the Category menu. Select IF and click OK. This function has three arguments. The first, Logical_test, is a statement that is either true or false. The second, Value_if_true, is what goes into the



cell if the statement proves true. The third, Value_if_false, is what goes into the cell if the statement proves to be false.

4 So far it all sounds very theoretical and complicated, but a practical example will make everything much clearer. Our logical test finds out whether or not the balance is less than zero. If it is, we've spent more than our budget. The expression for this is $C4 < 0$ (C4 is the cell that contains the balance figure). That's the first argument, and it goes in the first box in the dialog box. The second argument determines what should go into the cell if it is true. This will be the balance figure in cell C4, so enter C4 in the second box. The third argument says what should go in the cell if the statement is false. In this case we don't want the cell to display anything at all. To achieve this, enter two double-quotes with nothing between them into the third box. Having done that, click OK. Then copy this formula down the entire column of cells. Use the Font button on the toolbar to format the figures in this column in red.

5 Here you can see the result. Where we've spent more than we planned in our budget, the amount by which we've overspent is shown to the right of the relevant category. If we're within our budget, nothing appears here.

In the screenshot for this step, you'll see that two new items have been added to the bottom left. These are for the set of functions we're about to use. The idea is that the green box shows us where we've saved most money and the red box shows us where we've overspent most. Each box has three cells. To format these, highlight each in turn, select Format Cells and give them a thick border using the Border tab and a fill colour using the Patterns tab (the picture shows the Fill tab in Excel 2007). Enter Good! in the top cell in the Green box, and Warning! in the first cell in the Red box.

6 We'll start with the Good! figure. The first job is to find out where most money has been saved, or in other words, the highest balance figure. To find this, click in the cell below

the Good! heading. Then use the 'fx' button to insert the MAX function, which is one of the statistical functions. This can have more than one argument but, as with the AVERAGE function we tried last month, you can stick to one argument. Here the argument is the range of cells we want to check for the highest value, which is the column of balance cells – C4 to C13.

7 We'll use a similar method to find the minimum value for the Warning! figure. This time, use the MIN function on the same set of cells. Some of our balance figures will be negative values, but that doesn't bother the MIN function – it treats the highest negative value as the lowest number.

8 Next we need to get Excel to identify the categories in which these maximum and minimum values appear. For this we need to use the VLOOKUP function – its name is a contraction of vertical lookup. This is a good example to use because it demonstrates how some of Excel's more complicated functions can be quite pernickety and must be used in a careful, methodical fashion. Click on the third cell in the Good! box. If you placed these boxes one row below the table data, this will be cell A17. Then click on the 'fx' button. Select 'Lookup & Reference' in the Category box, and VLOOKUP in the list beneath. Click OK.

9 VLOOKUP searches for the row containing a particular value (the first argument) in the first column of a range of cells (second argument). It then looks across this range of cells to look up a value in another column (third argument). There's also a fourth true/false argument, which we'll explain later.

We know that the first argument is the value we want to look up. In this case, it's the maximum balance figure we've just found out with the MAX function. To enter this as the argument, simply click on that 'MAX' cell. In our example, this is cell A16.

10 Now we switch to the second argument, which is the Table-array box. This is the

range of cells in which we want to look for this value. You can see this selected in the screenshot for this step – it's the balance figures and the category labels beside them (cells C4 to D13 in our example). Remember, the function needs both sets of cells, because that's where it will look up the information we need.

11 Now we need to tell the function which column to check in order to find the data we want. This is the third argument – the Col_index_num box. The value we're looking for is in column 1 of the data range we selected in step 10, and the corresponding category label is in column 2. Enter that as the third argument.

Finally, there's the fourth argument in the Range_lookup box. By default, the VLOOKUP function requires the data to be sorted alphanumerically to work – otherwise it will return the wrong value. That's no good to us because the figures in the balance column can go up and down all the time, and we don't want to have to keep sorting the data. However, the only reason the VLOOKUP function insists on this is that if it can't find the exact value it can find the nearest match. We don't need this because we already have the exact value. This means we can use a special feature of the VLOOKUP function that switches off this nearest-match mode and looks only for an exact value. The advantage is that the function no longer requires the data to be sorted. To do this, enter False into the fourth argument box.

12 Follow the same process to enter a category in the Warning! box. If you've used our example worksheet, it should now look like the screenshot for this step. In this tutorial we've used the IF function to display overspends next to the relevant category or leave the cells blank if there is no overspend. Below the table of data we've used the MAX function to find the greatest saving and the MIN function to find the biggest overspend. Then, in both cases, we've used the VLOOKUP function to find out the categories in which this has occurred.

Now you've mastered these functions, you've no excuse for losing control of your finances. 

